Different Applications of Monochromatic Excimer Light in Skin Diseases

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Abstract

Background: Ultraviolet radiation has been used for curative purposes in dermatologic conditions, especially in the last 30 years. Objectives: We analyzed the efficacy of monochromatic excimer light in psoriasis, palmoplantar pustulosis, vitiligo, mycosis fungoides and alopecia areata, and to examine potential new indications. Methods: Two hundred seventy-nine patients with common and persistent skin diseases were enrolled in an open prospective study: 152 patients with stable and localized plaque psoriasis, 47 with palmoplantar psoriasis, 7 with palmoplantar pustulosis, 32 with vitiligo, 11 with prurigo nodularis, 9 with mycosis fungoides stage Ia, 8 with alopecia, 5 with localized scleroderma, 5 with genital lichen sclerosus, and 3 with granuloma annulare. The 308 nm excimer light was used at a power density of 48 mW/cm². An average of 12 sessions (range, 6–18), one session per week, was performed and yielded a total dose range of 4–12.5 J/cm². Clinical response was assessed using photos, biopsies, and specific clinical scores. Patients were monitored for 6 and 12 months for psoriasis, 12 months for mycosis fungoides, and 4 months for the remaining conditions. Results: We observed complete remission in more than 50% of patients with plaque psoriasis and palmoplantar dermatoses, respectively, complete remission in all patients affected by mycosis fungoides, excellent repigmentation in one third of vitiligo patients, hair regrowth in three patients with alopecia areata, an overall improvement in prurigo nodularis, a partial remission in patients affected by localized scleroderma, and a complete remission in most of the patients with genital lichen sclerosus and granuloma annulare. Conclusions: Our study confirms the use of monochromatic excimer light as a valid choice for the treatment of psoriasis, vitiligo, and mycosis fungoides; we also observed and report for the first time that monochromatic excimer light produces a therapeutic response in prurigo nodularis, localized scleroderma, genital lichen sclerosus, and granuloma annulare.

Introduction

Ultraviolet B (UVB) radiation in the range of 290–320 nm has been used in the treatment of a range of skin conditions during the last century. Light sources with narrowband UVB emission spectrum have been developed with the aim of increasing the divide between the benefits and side effects of the treatment. Narrowband UVB phototherapy using fluorescent lamps (TL01, 311 ± 2 nm) has been widely adopted over the last 10 years. A new source of narrow-band UVB known as monochromatic excimer light (MEL) emitting at 308 nm is now a topic of investigation. MEL 308 nm can be emitted as either coherent (laser) or noncoherent light. MEL is reported to be effective in the treatment of plaque psoriasis, flexural psoriasis, scalp psoriasis, palmoplantar pustulosis, alopecia areata, lichen planus, vitiligo, and patch stage mycosis fungoides (MF). MEL is more powerful than a UVB TL01 source and has the additional advantage of more accurate lesion targeting, which avoid UV damage to areas of healthy skin. Shorter treatment time, faster clearance, and reduced cumulative dose have also been observed with MEL. Recent studies suggest that 308 nm MEL achieves clinical remission in psoriatic skin partially through a decrease in cytokine expression. The efficacy of MEL in psoriatic skin is associated with significant T-cell depletion and alterations in apoptosis-related molecules, accompanied by a decreased proliferation index. These proposed hypothetical mechanisms of action are similar to those described following TL01 and broadband UVB and suggest the potential application of MEL in other inflammatory skin diseases.

In the current study we investigated the application of MEL in a wide variety of chronic and resistant localized dermatoses. These comprise psoriasis, palmoplantar...
pustulosis, vitiligo, MF, and alopecia areata, as well as the potential new indications of prurigo nodularis, genital lichen sclerosus, localized scleroderma, and granuloma annulare.

**Materials and Methods**

An open prospective study enrolled 279 patients with common and persistent skin diseases from January 2003 to December 2004 at the Dermatology Department, University of Rome “Tor Vergata”. The study group comprised 152 patients with stable and localized plaque psoriasis, 47 with palmoplantar psoriasis, 7 with palmoplantar pustulosis, 32 with vitiligo (generalized and acrofacial type), 11 with prurigo nodularis, 9 with MF stage Ia, 8 with alopecia (2 universalis and 6 areata), 5 with localized scleroderma, 5 with genital lichen sclerosus, and 3 with granuloma annulare (Table 1).

This study was conducted in accordance with the principles of the Declaration of Helsinki; ethical approval was granted by the local health authority and informed consent (for the treatment and photos) was obtained for all patients. Subjects were required to discontinue any conservative treatment for at least 4 weeks prior to the study. Topical chemotherapy and any other systemic treatments were discontinued for at least 4 months prior to MEL irradiation.

Age, sex, and degree of severity of the conditions were not considered in the inclusion and exclusion criteria.

Prior to treatment, patients were phototested on uninvolved skin to determine the minimal erythema dose (MED) of 308 nm UVB. This was performed by exposing a light-protected skin area to a dose range between 150 and 500 mJ/cm² (3–10 s). The MED reading was assessed at 24 h.

Photos and biopsies (in specific cases) were taken at baseline, on clinical remission (if present), and at follow-up. Monitoring was 4 months for all conditions with the exception of a group of patients with psoriasis or MF who were monitored for 12 months (Table 1). Routine analyses were performed only in patients affected by MF in order to better assess the clinical results after irradiation.

Clinical examination of patients with plaque psoriasis was assessed prior to each session and the Psoriasis Area and Severity Index (PASI) score was calculated once every 2 weeks. Response rate was defined as complete (an improvement in the PASI score of 75–100%), partial (50–75%), and low (25–50%). Clinical evaluation of palmoplantar psoriasis and palmoplantar pustulosis was assessed by the PASI and the Palmoplantar Pustulosis Psoriasis Area and Severity Index (PPPASI), respectively, prior to each session and then every 2 weeks. Patients were classified as “responders” if they exhibited a decrease in PASI and PPPASI as well as in the number of new and total pustules (>70% decrease) as compared with baseline. Assessment of treatment response of MF, prurigo nodularis, localized scleroderma, and granuloma annulare was histological. A punch biopsy was obtained from the lesional skin of each patient 4 weeks prior to first irradiation and after clinical remission. Assessment of treatment efficacy in vitiligo was based on the percentage of repigmentation in the treated area, evaluated separately by two physicians. The repigmentation score in patients with vitiligo was assigned to one of five categories: no repigmentation (score 0), poor repigmentation (1–25%, score 1), moderate repigmentation (26–50%, score 2), good repigmentation (51–75%, score 3), and excellent repigmentation (76–100%, score 4). The effect of MEL on alopecia areata was evaluated by assessing the area of hair regrowth.

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**Table 1. Patient Demographics and Treatment Response to Monochromatic Excimer Light**

<table>
<thead>
<tr>
<th>Condition</th>
<th>No. of patients</th>
<th>Sex</th>
<th>Mean age</th>
<th>Histological assessment</th>
<th>Clinical improvement at 4 months (%)</th>
<th>Follow-up (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaque psoriasis</td>
<td>152</td>
<td>M</td>
<td>80</td>
<td>n.p.</td>
<td>CR = 57</td>
<td>6-12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>72</td>
<td></td>
<td>PR = 27</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>46</td>
<td></td>
<td>SI = 16</td>
<td></td>
</tr>
<tr>
<td>Palmoplantar dermatoses</td>
<td>47</td>
<td>M</td>
<td>29</td>
<td>n.p.</td>
<td>CR = 54</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>25</td>
<td></td>
<td>PR = 28</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>52</td>
<td></td>
<td>SI = 18</td>
<td></td>
</tr>
<tr>
<td>Vitiligo</td>
<td>32</td>
<td>M</td>
<td>16</td>
<td>n = 9</td>
<td>Good = 26</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>16</td>
<td></td>
<td>Excellent = 31</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>38</td>
<td></td>
<td>SI = 18</td>
<td></td>
</tr>
<tr>
<td>Mycosis fungoides</td>
<td>9</td>
<td>M</td>
<td>7</td>
<td>n.p.</td>
<td>100</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>2</td>
<td></td>
<td>CR = 80</td>
<td>4</td>
</tr>
<tr>
<td>Prurigo nodularis</td>
<td>11</td>
<td>M</td>
<td>4</td>
<td>n = 9</td>
<td>37</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>7</td>
<td></td>
<td>PR = 60</td>
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<td></td>
<td>58</td>
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<td>SI = 40</td>
<td></td>
</tr>
<tr>
<td>Alopecia</td>
<td>2</td>
<td>M</td>
<td>8</td>
<td>n.p.</td>
<td>CR = 67</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>0</td>
<td></td>
<td>PR = 33</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>36</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Genital lichen sclerosis</td>
<td>5</td>
<td>M</td>
<td>3</td>
<td>n = 1</td>
<td>CR = 80</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>2</td>
<td></td>
<td>PR = 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Localized scleroderma</td>
<td>5</td>
<td>M</td>
<td>0</td>
<td>n = 5</td>
<td>CR = 80</td>
<td>4</td>
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<tr>
<td></td>
<td></td>
<td>F</td>
<td>5</td>
<td></td>
<td>PR = 60</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>46</td>
<td></td>
<td>SI = 40</td>
<td></td>
</tr>
<tr>
<td>Granuloma annulare</td>
<td>3</td>
<td>M</td>
<td>2</td>
<td>n = 1</td>
<td>CR = 67</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F</td>
<td>1</td>
<td></td>
<td>PR = 33</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n.p., not performed; CR, complete remission; PR, partial remission; SI, slight improvement.
A clinical evaluation comprising three grades (complete remission, partial remission, and no remission) was used to assess improvement in genital lichen sclerosus, localized scleroderma, and prurigo nodularis.

Irradiation procedure

The 308 nm MEL (Excilite; Deka Medical Lasers, Florence, Italy) was used at a power density of 48 mW/cm² with a maximum irradiation area of 512 cm² at 15 cm distance from the skin. Only the affected areas were irradiated and the surrounding nonaffected skin was protected by using appropriate filters. Prior to irradiation, the skin was cleaned with a 0.9% NaCl (w/v) solution. Ointment petrolatum was applied on the scaly patches only in patients with plaque psoriasis, in order to minimize light reflection by the skin. Each lesion was irradiated and the initial dose was determined by increasing or sometimes decreasing MED, according to clinical aspect (i.e., infiltration, scaly, erythematous component, anatomical region) and treatment response (i.e., evaluation of erythema, blistering, no response). Treatment started with low doses that increased progressively until a marked positive effect was achieved.

The initial dose was increased up to 3 or 4 times MED on thick infiltrated psoriatic lesions. When slight erythema occurred, the next dose was reduced by 25%. When mild to moderate erythema or blistering occurred we restarted treatment after a 1 week interval by decreasing the last dose by 25%.

This method was applied to all lesions treated except vitiligo and genital lesions; we applied the initial dose of 75% MED and increased subsequent treatments by 25% of the dose used in the previous session. Asymptomatic slight erythema occurred up to 24 hours after treatment in most of patients. An average of 12 sessions (range, 6–18), with one session per week, was performed.

Results

For the majority of skin conditions, clinical improvement was evident after a few treatment sessions. The treatment parameters including mean number of MED applied and number of treatments, and the responses varied in this heterogeneous group of diseases (Tables 1 and 2). A total of 269 patients completed the study. Reasons for discontinuing the study were work or personal commitments (four patients), perceived lack of treatment efficacy (three patients), blistering as side effect (one patient), willing to be treated with the previous therapeutic regimen (one patient), and unresponsiveness (one patient).

Plaque psoriasis

One hundred fifty-two patients were enrolled and 149 completed treatment. Follow-up was performed at 1 year (57 patients) and 6 months (92 patients). A maximum of 16 sessions were performed. After 4 months, 85 patients (57%) showed a complete remission, 40 patients (27%) had partial remission, and 24 patients (16%) had only slight improvement. In those patients who had complete remission additional maintenance sessions of 2 J/cm² every 14 days were carried out for 120 days. Lesions located on the legs and on the lumbar-sacral region showed the slowest response rate.

Palmoplantar dermatoses

All 54 patients (47 palmoplantar psoriasis and 7 palmoplantar pustulosis) completed treatment with a mean number of 10 sessions and an irradiation dose comparable to that used for localized psoriasis. After 4 months a complete remission was observed in 29 patients (54%), a partial remission in 15 patients (28%), and a slight improvement in 10 patients (18%). All patients achieved a partial or total remission after the fourth session. An improvement between 50% and 75% in PASI and PPPASI scores was maintained to the 16-week follow-up in 46 out of 54 patients, and all patients (54/54) that completed treatment maintained the achieved result at this time point. In Fig. 1 we show a successful case.

Vitiligo

We selected 32 patients that had vitiligo, 19 of the generalized/acrofacial type and 13 of the symmetrical/bilateral type. Thirty patients completed the study. Their clinical pattern comprised stable patches (cutaneous depigmentation present for more than 8 months) covering a body surface between 20% and 55%. After 4 months, the

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mean MED (J/cm²)</th>
<th>Mean starting dose (J/cm²)</th>
<th>Mean dose per session (J/cm²)</th>
<th>Mean total dose (J/cm²)</th>
<th>Mean no. of treatments</th>
<th>Range of treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaque psoriasis</td>
<td>0.25</td>
<td>0.5</td>
<td>2</td>
<td>12.5</td>
<td>11</td>
<td>6–16</td>
</tr>
<tr>
<td>Palmoplantar dermatoses</td>
<td>0.3</td>
<td>0.75</td>
<td>1.5</td>
<td>9.5</td>
<td>10</td>
<td>6–14</td>
</tr>
<tr>
<td>Mycosis fungoides</td>
<td>0.3</td>
<td>0.25</td>
<td>1</td>
<td>7</td>
<td>7</td>
<td>4–10</td>
</tr>
<tr>
<td>Vitiligo</td>
<td>0.2</td>
<td>0.1</td>
<td>0.5 (body)</td>
<td>64</td>
<td>12</td>
<td>8–30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.3 (face)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prurigo nodularis</td>
<td>0.35</td>
<td>0.5</td>
<td>1.5</td>
<td>15</td>
<td>12</td>
<td>6–10</td>
</tr>
<tr>
<td>Alopecia</td>
<td>0.25</td>
<td>0.15</td>
<td>0.5 (face)</td>
<td>67.25</td>
<td>12</td>
<td>6–10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.8 (scalp)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genital lichen sclerosus</td>
<td>0.2</td>
<td>0.1</td>
<td>0.5</td>
<td>4.5</td>
<td>10</td>
<td>4–8</td>
</tr>
<tr>
<td>Localized scleroderma</td>
<td>0.3</td>
<td>0.25</td>
<td>1.5</td>
<td>10</td>
<td>7</td>
<td>8–12</td>
</tr>
<tr>
<td>Granuloma annulare</td>
<td>0.35</td>
<td>0.25</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>6–10</td>
</tr>
</tbody>
</table>

MED, minimal erythema dose.
degree of repigmentation was rated as modest in 12 (40%) patients, good in 8 patients (26%), and excellent in 10 patients (31%). The lesional sites with the best response rates were face (Fig. 2), neck, hands, inguinal fold, and knees.

Mycosis fungoides

Nine patients received clinical diagnoses of patch-stage MF (stage Ia) with a total of 19 lesions showing complete clinical remission, with marked decrease in size and infiltration of the patches and skin color normalization, turning from bright red to pale brown. All histological specimens of irradiated lesions showed a reduction of lymphocytic infiltrate in the papillary dermis. No signs of epidermotropism and atypical lymphocytes along the dermo-epidermal junction were detected histologically following clinical remission. Twelve months after treatment all lesions remained in complete remission.
**Prurigo nodularis**

Nine out of 11 patients completed treatment and 2 patients discontinued treatment at the third and fifth session, respectively, for reasons unrelated to the treatment. A decrease in the pruritic symptoms associated to a clinical and histological improvement was achieved in nine patients after 6–10 applications. Mild hyperpigmentation occurred at the lesional sites in 7 out of 11 patients especially on the pre-tibial nodules.

**Alopecia**

We treated two patients with alopecia universalis and six with localized alopecia areata of the scalp and beard. Treatment was performed until hair regrowth and this result was achieved in three patients, one with alopecia universalis and two with alopecia areata of the scalp. Three patients considered the treatment unsatisfactory and discontinued the study.

**Genital lichen sclerosus**

A total of five patients, three men and two women, with a clinical diagnosis of lichen sclerosus were treated. A 3 mm punch biopsy was performed in one patient to confirm our results: no inflammation was observed, but sclerosis with evidence of actinic reaction was found despite improvement of skin texture with regression of the plaques. This clinical finding was achieved in four out of five patients (two men and two women) with reduction in size and thickness of the lesion.

**Localized scleroderma**

Five patients with a total of 11 plaques were treated and a 4 mm punch biopsy was performed 4 weeks before and after treatment in one patient with evidence of a post treatment actinic reaction with mild sclerosis and fibrotic degeneration of the dermis. Marked improvement of skin texture with residual hyperpigmentation was observed in three patients (Fig. 3). Improvement was less evident in the other two.

**Granuloma annulare**

Complete clinical remission with reduction in size and infiltration of the lesions treated was achieved in two out of three patients (Fig. 4). One patient showed only a partial reduction of erythema and infiltration.

**Side effects**

Common side effects included mild erythema (observed in at least 50% of patients) after the first and second application, mild pruritic sensation, and transient (rarely permanent) hyperpigmentation in the treated areas, which spontaneously resolved 2 weeks after treatment. Formation of vesicles and edema was observed in three psoriatic patients, which resolved following topical application of 1% hydrocortisone ointment for 3 days.

**Discussion**

We report for the first time that MEL produce a therapeutic response in common and resistant skin diseases such as prurigo nodularis, localized scleroderma, genital lichen sclerosus, and granuloma annulare. In these conditions we observed a remission in 80% of patients with prurigo nodularis; a partial remission in 60% of patients affected by localized scleroderma; a complete remission and a partial remission in 80% and 20%, respectively, of patients affected by genital lichen sclerosus; and a complete remission in 67% of patients with granuloma annulare. The clinical remission observed in these conditions might be explained by the immunosuppressive effect of MEL on T cells and cytokine responses of MEL. Bianchi et al.9 showed that in a chronic skin disease, T-cell–mediated-like psoriasis, MEL treatment causes a significant depletion of T cells and alterations in apoptosis-related molecules, accompanied by a decreased proliferation index. The outcomes in the current study are in agreement with the drastically decreasing cytokine expression demonstrated by Cappugi et al.13 and with the T-cell apoptosis showed in vitro by Novak et al.14

![FIG. 3. Localized scleroderma before and after monochromatic excimer light treatment.](image)
These conditions are considered difficult to treat and the existing therapies are generally unsatisfactory. In the treatment of prurigo nodularis, localized scleroderma, genital lichen sclerosus, and granuloma annulare, topical or intralesional glucocorticoids are the therapies of choice. However, several other therapies have been reported such as tacrolimus in genital lichen sclerosus, calcipotriene in localized scleroderma, and capsaicin in prurigo nodularis. Current therapies may be associated with side effects such as the localized atrophy associated with corticosteroid application and the lack of the long-term effectiveness. Consequently, there is a need for effective and safe treatment. The response to MEL of prurigo nodularis, localized scleroderma, genital lichen sclerosus, and granuloma annulare reflects a promising advance in their treatment.

The use of 308 nm excimer light in dermatology has been reported since 1997. Several authors observed the efficacy of the light produced by xenon-chloride excimers at 308 nm in the treatment of stable forms of localized plaque psoriasis, vitiligo, and localized dermatoses with a satisfactory benefit/risk ratio. MEL is more powerful than a UVB TL01 source and has the additional advantage of more accurate lesion targeting, which avoids UV damage to areas of healthy skin areas and the inconvenience of several clinical visits. The use of direct-targeted narrowband UVB light would maximize the effectiveness of narrowband UVB phototherapy minimizing the risk for adverse side effects. Shorter treatment time, faster clearance, and reduced cumulative dose have also been observed as compared to TL01. Furthermore, we observed a high percentage of treatment compliance possibly due to the advantage of a weekly treatment as compared to daily care, which is required for other topical therapies.

However, a further modification of the treatment protocol followed in this clinical experiment is needed. We will presumably be able to optimize and establish the dose and the number of treatments with regard to the features of the skin disease and the clinical response.

In contrast to previous studies we report the efficacy of MEL in a large number of subjects ($n = 269$) and a wide disease spectrum. We have also reported the dosimetry regimes in relation to indication and anatomical distribution, and the clinical and histological responses.

As previously stated, the initial dose was determined by increasing or sometimes decreasing MED, according to clinical appearance (i.e., infiltration, scaly or erythematous component, anatomical region) and treatment response (i.e., evaluation of erythema, blistering, no response). On thick infiltrated psoriatic lesions the initial dose was increased up to 3 or 4 times MED; when slight erythema occurred, the next dose was reduced by 25%. When mild to moderate erythema or blistering occurred we decreased the last dose by 25% after 1 week interval.

This method was applied to all lesions treated except vitiligo and genital lesions. For these, we used an initial dose of 75% MED and increased subsequent treatments by 25% of the dose used in the previous session. Asymptomatic slight erythema occurred up to 24 hours after treatment in most of patients.

The number of sessions performed per indication is described in Table 2.

In our study we performed a long assessment of psoriasis response with a 6–12 month follow-up, with MEL proving to be effective for the majority of our patients (57%). Similar efficacy has been previously reported by other authors who showed that 308 nm excimer light and laser therapy is a safe and effective treatment for localized plaque psoriasis, comparable or better than standard topical therapy or 311 nm UVB. Feldman et al. in a multicenter study of 80 patients showed that monochromatic 308-nm excimer laser is effective and safe for psoriasis. Gupta and Taylor showed MEL to be safe and effective in recalcitrant scalp psoriasis. Similarly, Cappugi et al. and Campolmi et al. showed an improvement ranging from 75% to 100% with MEL in palmoplantar psoriasis with no relapse during a 16-week follow-up. Our results on localized plaque psoriasis (57% remission) and in palmoplantar dermatoses (55% remission) also support the data of previous studies using MEL. According to the aforementioned studies and in contrast with Aubin et al. we observed similar results in the treatment of...
The results of this study indicate the efficacy of MEL in vitiligo and show various advantages compared to other phototherapies such as earlier and larger repigmentation, and lesion selectivity without perilesional skin involvement. Furthermore, we observed that the lesions with the best response rates were on the face, neck, knees, inguinal fold, and the hands. Several authors reported efficacy of MEL in the treatment of vitiligo.4–6,18–20 Spencer et al.4 treated 18 subjects (the majority of whom other conventional treatments had failed) reporting some advantages of targeted phototherapy with the 308 nm excimer laser such as the lower number of treatments needed to achieve satisfactory repigmentation compared with conventional narrow band (NB) UVB. Baltas et al.18 confirmed these results showing a marked improvement of vitiligo on the elbows of a 24-year-old woman of skin phenotype III after several years’ follow-up. Leone et al.5 demonstrated that 308 nm MEL may be considered a more effective therapy for vitiligo when compared to NB UVB phototherapy based on the rapid repigmentation, shorter treatment time frames, and better compliance of patients. According to Leone et al.5 and Taneja et al.6 certain anatomical sites respond better than others. In our study the best response was achieved for lesions located on the face, neck, knees, and with very good results on the hands. All our patients were treated once every week; this schedule is in contrast with Hofer et al.20 who suggested that the number of treatments in a week are crucial to obtain a satisfactory clinical response. They reported that in vitiligo treatment, periods of more than 12 weeks may be necessary to obtain a satisfactory clinical repigmentation particularly when vitiligo lesions are treated only once or twice per week as compared to three times per week.

Mori et al.21 showed clinical and histological remission of the stage Ia MF in all patients indicating MEL as a valid option in the treatment of early T-cell lymphoma. Similar to Mori et al.21 we have reported a complete clinical and histological remission of MF (stage Ia). Our regimes do not differ significantly from those applied in their protocol

Finally, similar to Aubin et al.,2 we report that patients with alopecia may also benefit from MEL.

In this study we demonstrated the advantages of MEL such as the selective use of high doses, with a reduction in the number of treatment sessions as compared with traditional phototherapy for the treatment of psoriasis, vitiligo, and MF.

Although the presence of many variables (age, sex, degree of severity of the conditions) and the lack of routine blood analysis and fluorescence investigations before and after irradiation represent important limitations, this study reports the use of MEL as a valid choice for the treatment of difficult-to-treat skin conditions with a good overall efficacy in absence of topical or systemic drugs in a large group of patients. We observed and reported in literature for the first time that MEL produces a therapeutic response in common and resistant skin diseases such as localized scleroderma, genital lichen sclerosus, and granuloma annulare. These findings represent an important advance in the treatment of above-mentioned disease suggesting MEL as a valid and new therapeutic option.

The obtained results are encouraging, although availability and the small number of centers able to provide this treatment modality are limiting factors. More studies are necessary to compare different therapeutic schemes and to assess any lasting side effects such as DNA damage and carcinogenesis. In addition, future investigations such as spectroscopic and fluorescence studies could lead to valuable information about the penetration depth of the wavelength used and metabolic changes induced by the treatment.

Disclosure Statement
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References


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